

Research progress of Chinese sucker (*Myxocyprinus Asiaticus*)

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Abstract— In order to help readers, understand the current research situation of *Myxocyprinus Asiaticus* in China, the author collated the research on the resource status, reproductive development, artificial breeding, nutrition research and disease of the *Myxocyprinus Asiaticus*. In the future, we should increase the number of populations, strengthen the protection of wild resources, research on artificial breeding, popularization of breeding technology and genetic research.

Keywords— Chinese sucker, *Myxocyprinus Asiaticus*, Resources distribution.

I. INTRODUCTION

Myxocyprinus Asiaticus belongs to Osteichthyes, Catostomidae and *Myxocyprinus Asiaticus* genus. *Myxocyprinus Asiaticus* is an important economic fish with high economic value, edible value and ornamental value. The content of crude protein is high, the content of crude fat is moderate, and the content of calcium, phosphorus and iron is rich. The fish meat contains eight necessary amino acids that people need, accounting for 37.16% of the total amino acids; it contains two semi-necessary amino acids that people need, accounting for 8.38% of the total amino acids. Its content of amino acids related to taste accounted for 35.54%, so its meat was delicious. Due to the longer sexual maturity of the *Myxocyprinus Asiaticus*, the survival rate in the wild is low and the population is scarce. At present, China encourages the cultivation and release of the *Myxocyprinus Asiaticus*. Therefore, deepening people's understanding of *Myxocyprinus Asiaticus* is of great significance to the protection of *Myxocyprinus Asiaticus* resources, the utilization of economic value and the improvement of breeding level.

II. CURRENT SITUATION OF MYXOCYPRINUS ASIATICUS

Myxocyprinus Asiaticus is delicious, nutritious and has high ornamental value. It is a valuable economic fish. *Myxocyprinus Asiaticus* are mostly found in eastern Asia and western North America. Most of the *Myxocyprinus Asiaticus* are distributed in the upper and middle reaches of the Yangtze River. At the same time, there are a very small number of distributed in the Minjiang river^[1]. Due to a series of reasons, such as overfishing, serious damage to the living environment and a long reproductive cycle, the total resources of the *Myxocyprinus Asiaticus* have been decreasing. It has been listed as the second-class aquatic wild animal in China. At present, the *Myxocyprinus Asiaticus* is one of the eight vulnerable species and is listed in the book "China endangered species red book: fish" published in 1998^[2].

III. STUDIES ON THE REPRODUCTIVE DEVELOPMENT AND ARTIFICIAL CULTURE OF MYXOCYPRINUS ASIATICUS

Because the breeding rate of *Myxocyprinus Asiaticus* in natural state is low and the total resources are declining, it is particularly important to breed *Myxocyprinus Asiaticus* artificially.

3.1 Sexual maturity time and breeding conditions of *Myxocyprinus Asiaticus*

The development and maturation time of *Myxocyprinus Asiaticus* was relatively late. The sexual maturation time of wild males was more than 5 years, and that of females was more than 6 years^[3]. *Myxocyprinus Asiaticus* breed from early March to late April each year. The fertilized eggs of *Myxocyprinus Asiaticus* have many characteristics, such as weak stickiness, higher density than water, the stickiness disappears soon after fertilization and most of the eggs are laid in the early morning of sunny day^[4]. It is necessary to hatch it with slow-flowing water to make the egg grains unable to accumulate, which will increase the hatching rate. The dissolved oxygen in water should be above 5 mg/L, and the best water temperature should be kept between 18°C[®] and 20°C to hatch the membrane need 7-8 day and night. it takes 120 hours to hatch the membrane in 19°C ~24°C water temperature^[5].

3.2 Artificial culture of *Myxocyprinus Asiaticus* parent fish

The quality of oocyte development depends on the development of parent fish, and then affects the spawning rate, fertilization rate and hatching rate of *Myxocyprinus Asiaticus*. When choosing parent fish, we should choose those with strong body, normal surface mucus and no obvious scars on body; body weight should be over 8 kg; male fish should be over 5 years old, female fish should be over 6 years old; the secondary accessory-sexual characteristic is obvious, and male fish is

full of stars with milky white semen flowing out when abdomen is lightly pressed. Female fish should have a fuller abdomen and many stars on the buttocks and tails. Autumn was a very critical period for the gonad development of parent fish. In autumn, the transparency of the pond should be kept within 20 cm to 30 cm, and we can't stop feeding bait, and the feeding should be reduced with the decrease of water temperature. In spring, the parent fish should open mouth as early as possible, and when the water temperature rises to more than 10 °C, the pond water should be controlled at about 0.8 m to 1m to increase the water temperature, and flush regularly in autumn and winter^[6]. The influence of culture density and water temperature on the growth of *Myxocyprinus Asiaticus* was very great. It was concluded that the culture density should not exceed 40 /m. It should be kept at the optimum density of 30/m to 40/m. The water temperature should not exceed 32 °C, and the optimum breeding temperature should be kept at 24 °C^[7].

IV. PREVENTION AND TREATMENT OF COMMON DISEASES OF MYXOCYPRINUS ASIATICUS

Diseases of *Myxocyprinus Asiaticus* in the process of artificial cultivation not only bring great losses to the cultivation of cochineal fish, but also have a great impact on the healthy development of the aquaculture industry.

According to Tian's research^[8], we can find that the main diseases of *Myxocyprinus Asiaticus* and prevention methods are as follows:

4.1 Gili-rot disease:

The clinical symptoms are retardation of movement, poor appetite, discoloration and whitening of gill filaments, and even the end becomes putrid and mucus increases.

Treatment methods: The rotten gills are mostly caused by poor water quality and high breeding density. Chlorine dioxide (8%) can be sprinkled on the pond to disinfect it for 10 minutes, once a day for 3 to 5 days.

4.2 Printing disease

The clinical manifestations are as follows: the tail of diseased fish showed spots like red seals, scales falling off, muscle decay, skin congestion and inflammation.

Treatment methods: Use povidone iodine (1%) 10-20 mg/L to disinfect once a day for one to two hours. Use it for three to five days.

4.3 Red skin disease

The clinical symptoms are as follows: large scale exfoliation, epidermal inflammation, mucus increase, fin congestion and even decay.

Treatment methods: Sprinkle the whole pool with chlorine dioxide (8%) for 10 minutes once a day for three to five days.

4.4 Ichthyophthiriasis

Also known as white spot disease, the clinical feature is that the fish body is covered with white spots and the surface looks like being covered with a layer of white membrane.

Treatment methods: Use methylene blue to disinfect the water, and make the concentration of methylene blue in the water 3-5 mg/L. After disinfection for 2 hours, fresh water is added again, once a day for three to five days.

4.5 Dactylogyriasis

The clinical symptoms are not obvious. If we open the gill cap, we can see that the gill filaments are swollen and dark red.

Treatment methods: Oral administration of levofloxacin bait (30 mg/kg body weight) and use methylene blue to soak, to make the concentration in the pond about 5.0mg/L. After 12 hours of immersion, dilute it, once every other day and continuous use for 3 times.

4.6 Japanese arguliosis disease

The clinical symptoms are the presence of arguliosis parasites in many parts of the body.

Treatment methods: Use 90% crystal dipterex to disinfect the pond, make the concentration of dipterex in the water 0.3-0.5mg/L. After soaking for 1-2 hours, the water was infused again, once every other day, for two to three days.

4.7 Neospora

The clinical features are: gill filaments were enlarged, mucus increased, and there were many white cysts on the gill filaments.

Treatment methods: use 90% crystal dipterex to disinfect the whole pond, make the concentration of dipterex in the water 0.3-0.5mg/L. After soaking for 1-2 hours, the water was infused again, once every other day, for three to five days.

V. STUDY ON NUTRITIONAL ASPECTS OF MYXOCYPRINUS ASIATICUS

Only relying on natural food cannot meet the needs of *Myxocyprinus Asiaticus* farming. Therefore, it is particularly important to synthesize artificial bait, which is suitable for *Myxocyprinus Asiaticus*. The feed is the first guarantee for high and stable production in fish culture, so it is also very beneficial for the growth and development of fish to prepare appropriate feed. By studying the nutritional aspects of *Myxocyprinus Asiaticus*, we can find out the most suitable feed formula for *Myxocyprinus Asiaticus*.

5.1 Feeding characteristics and necessary nutrients of *Myxocyprinus Asiaticus*

The *Myxocyprinus Asiaticus* is an omnivorous fish. In natural environment, it mainly eats benthic invertebrates, such as dragonfly larvae and aquatic insects. At the same time, it also feeds on aquatic plant debris and algae. Han [9] explored the effects of feed fat and protein levels on the growth of *Myxocyprinus Asiaticus*, a series of experiments were carried out to compare and conclude that the optimum fat level is 6% - 8%, and the optimum protein level is 40%.

Ye^[10] studied the effects of different feeds on the growth of *Myxocyprinus Asiaticus*. He selected four groups of feeds: feed, water earthworms, artemia, mix of feed and water. Under the same and suitable conditions, the results showed that the specific growth rate of the mixed group was the highest, followed by the water earthworm group, the feed group and the artemia group. When the proportion of feed in the mixed group was 50%~60%, the growth and development of fry was the best. Adding water worms can make up for the lack of nutrients in the feed, and this enables *Myxocyprinus Asiaticus* to absorb more comprehensive nutrients and better use them for growth, reproduction and development.

Zhang^[11] considered that vitamin E was very important for the growth and development of *Myxocyprinus Asiaticus* fry. Increasing the intake of vitamin E can improve the muscle quality of *Myxocyprinus Asiaticus* appropriately. The growth performance of *Myxocyprinus Asiaticus* fry can be improved by adding vitamin E in the feed, but it will be inhibited if it is excessive. When the content of vitamin E in the feed is 50.6mg/kg, *Myxocyprinus Asiaticus* fry will get the best growth performance.

5.2 Choice of larva feed for *Myxocyprinus Asiaticus*

Xu^[12] selected different kinds of feed: rotifer add artemia group and aquatic-seedling formula feed group to feed healthy *Myxocyprinus Asiaticus* fry. By comparison, the effects of the two feeds on the growth rate of *Myxocyprinus Asiaticus* fry were basically the same, but the effects on the survival rate of *Myxocyprinus Asiaticus* fry were quite different. The average survival rate of *Myxocyprinus Asiaticus* fry fed rotifer and artemia reached 84.0%, while that of *Myxocyprinus Asiaticus* fry fed with aquatic-seedling formula feed was only 80.0%. It can be concluded that the living-body feed is a better choice for larva feed of *Myxocyprinus Asiaticus* fry.

5.3 Study on the transferred-feeding culture of *Myxocyprinus Asiaticus*

Yi^[13] studied the transferred-feeding cultivation of *Myxocyprinus Asiaticus*. The experiment was conducted at the same water temperature (24±0.5) °C. Use fairy shrimp, water worms, micro-pellet feed and spirulina as the larva feed. After comparison, it is very feasible to feed artificial feed as early as possible. The earlier the *Myxocyprinus Asiaticus* fry eats artificial diet, the easier it is to change its diet. According to the comprehensive survival rate, growth and digestive physiological indexes, it was a feasible strategy to co-feed *M. asiaticus* larvae with 3 diets (fairy shrimp, feed and spirulina) and wean on 40 dph.

VI. SUMMARY AND PROSPECT

Myxocyprinus Asiaticus has very high economic value, ornamental value and edible value. However, due to the environment destruction by human beings and the low reproductive rate, the number of them has been very scarce. In the future, our main research direction should be how to improve the number and survival range of this species so as to increase the number of its population; how to effectively protect *Myxocyprinus Asiaticus* and how to strengthen the breeding and release of

Myxocyprinus Asiaticus; focusing on the promotion of aquaculture technology and popularization of related aquaculture knowledge; put forward a series of measures to encourage artificial cultivation of *Myxocyprinus Asiaticus* and strengthen the in-depth study on the biology and genetics of *Myxocyprinus Asiaticus*, so as to enlarge the depth and breadth of people's understanding about *Myxocyprinus Asiaticus*.

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